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GarrettCom™
Ethernet at Its Best℠

Magnum ES42 Edge Switches

Installation and User Guide

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Magnum™ ES42 Series Edge Switch
Installation and User Guide

Part #: 84-00141 Rev. A (02/05)

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Important: The Magnum ES42-Series 10/100 Mb/s Edge Switches contains no user serviceable parts. Attempted service by unauthorized personnel shall render all warranties null and void. If problems are experienced with Magnum ES42 10/100 Mb/s Edge Switch products, consult Section 5, Troubleshooting, of this User Guide.

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Federal Communications Commission

Radio Frequency Interference Statement

This equipment generates, uses and can radiate frequency energy and if not installed and used properly, that is in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

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Revisions

Rev A 05/05: Minor updates on MDIX (Auto-cross)

Rev A 02/05: Initial release of this user manual for ES42 Edge Switches

GarrettCom, Inc. reserves the right to change specifications, performance characteristics and/or model offerings without notice.

1.0 SPECIFICATIONS

1.1 Technical Specifications

Ports Performance

When a port is operating at 100Mbps:
Data Rate: 100Mbps
When a port is operating at 10 Mbps:
Data Rate: 10 Mbps

Network Standards

100Mb: Ethernet IEEE 802.3u, 100BASE-TX, 100BASE-FX
10 Mb: Ethernet IEEE 802.3, 10BASE-T
Auto-sensing for speed: IEEE 802.3u

Packet-Processing Between Domains

Filter and Forward Rate from 100Mbps ports: 148,800 pps max
Filtering and Forwarding Rate from 10 Mbps ports: 14,880 pps max.
Processing type: Store and Forward, non-blocking
Auto-learning: 2K address table

Address buffer age-out time: 300 sec.
Packet buffers memory: 128KB, dynamically shared on all domains
Latency (not including packet time): 100 to 10 Mbps: 5µs
10 to 100Mbps: 15µs

Path Delay Value: 50 BT on all ports

LLL(Link-Loss-Learn): Factory default is activated on port 1 and 2
(allow to flush the internal address buffer , and qualify to use with S-Ring and RSTP for faster recovery in ring topology)

Maximum Ethernet Segment (or Domain) Lengths

10BASE-T (Unshielded twisted pair)	- 100 m (328 ft)
100BASE-TX (CAT 5 UTP)	- 100 m (328 ft)
100BASE-FX, half-duplex: (multi-mode)	- 412 m (1350 ft)
100BASE-FX, full-duplex: (multi-mode)	- 2 km (6,562 ft)
100BASE-FX, half-duplex: (single-mode)	- 412 m (1350 ft)
100BASE-FX, full-duplex: (single-mode)	- 20 km (65,620 ft)
100BASE-FX, full-duplex: (single-mode, long reach)	- 40 km (131,240 ft)

Operating Environment

ES42: 32°F to 104°F (0°C to 40°C)

ES42H: -13°F to 140°F (-25°C to 60°C) Long term per agency tests (UL).
-40°F to 149°F (-40°C to 85°C) Short term per IEC Type tests.

ES42P: -40°F to 167°F (-40°C to 75°C) Long term per agency tests (UL).
-58°F to 212°F (-50°C to 100°C) Short term per IEC Type tests.

Storage Temperature,

All models: -40°F to 160°F (-40°C to 85°C)

Cold Start:

ES42H to -20ºC

ES42P to -40ºC

Ambient Relative Humidity: 5% to 95% (non-condensing)

Altitude (All models): -200 to 5000ft. (-60 – 15,000 m)

Conformal Coating (optional) for humidity protection

Note: H and P models are designed for NEBS compliance, including, vibration, shock and altitude.

Packaging:

Enclosure: Rugged sheet metal (Steel).
Dimensions of the Switch unit:
3.7 in H x 3.0 in W x 1.7 in D (9.4 cm x 7.6 cm x 4.3 cm)

Weight: all models: 9.5 oz. (285g);
Power supply, –d, and i: 5.8 oz (165g)
–Hd, and Hi: 5.8 oz (165g)
–Pd, and -Pi: 7.9 oz (225g)

Cooling Method:

Convection on the office model. The hardened (H) factory floor and premium (P) temperature un-controlled location models have closed cases to withstand dirt and use special thermal techniques to transfer heat to the outside of the case for cooling.

ALARM RELAY Terminal Block, H and P models only, two screw terminals:

Internal 60VA relay contact: Open for power Off, closed for power On (Hardware).

POWER SUPPLY

These products are intended to be supplied by a Listed, Direct Plug-In power unit, marked "Class 2", or a Listed ITE Power Supply, marked "LPS", which has suitably rated output voltage (i.e. 9vdc, 12vdc, 24vdc, 48vdc), and suitably rated output current (i.e. 100mA to 500mA).When connected to a 48V centralized DC source, these products shall be provided with a Listed 5 A DC fuse in the supply circuit.

AC POWER SUPPLY (using an external power adapter):

All models have an (8-15)VDC output with 6ft long cord and a 2.5mm center +ve jack. The external AC power supplies are temperature rated to match the Edge Switch ratings.

Office Models Ratings (0 to 40°C)

North America (-d) models. Input: direct plug-in 95-125vac at 60 Hz.
Output:12vdc, 1Amps

International (-i) models. Input: 240vac at 50Hz with IEC 320 connector for the user supplied AC power cord.
Output:12vdc, 1Amps

Factory Floor Models (H) Ratings (-25 to 60°C)

North America (-Hd) models. Hardened, factory floor temperature rated. Input: 6ft AC 3power cord to IEC 320 connector on the 100-240vac 47-63Hz external power adapter.
Output:12vdc, 1.25Amps

International (-Hi) models. Factory floor temperature rated. Input: IEC 320 connector on the 100-240vac 47-63Hz external power adapter. Requires a user supplied power cord
Output:12vdc, 1.25Amps.

Temperature un-controlled Premium(P) Ratings (-40 to 75°C)

North America (-Pd) models. Outdoor temperature rated. Input: 6ft AC power cord to IEC 320 connector on the100-240vac 47-63Hz external power adapter.
Output:12vdc, 2Amps.

International (-Pi) models. Outdoor temperature rated. Input: IEC 320 connector on the 100-240vac 47-63Hz external power adapter. Requires a user supplied power cord.
Output:12vdc, 2Amps.

Direct DC POWER SUPPLY : built-in terminal block for +, -, ground along with 12VDC jack

12V DC internal (range 8.0 to 15V DC),

24V DC internal (range 10 to 36V DC),

-48V DC internal (range 30 to 60V DC),+ , -, ground.

Note: **DUAL-SRC-24KIT-** For ES42H or P -24VDC unit only (sold separately). See 3.6.

Power Consumption: See Section 3.6.
Note 1: the 12V DC jack can be used for dual source DC input using an AC adapter and the DC terminal block. Power supply protection is provided by internal diodes.
Note 2: The Direct DC power floats. The user may ground either "+" or "-" if desired.

Power Consumption, all models: 7.0 watts typical, 9 watts max.

Port Connectors:

RJ-45 Ports: support 100BASE-TX and 10BASE-T with auto-cross (MDIX). They are shielded 8-pin female connectors for shielded (STP) and unshielded (UTP) Cat 3, 4, 5 cable.

One Fiber optic port: On the ES42 Series it is 100Base-FX with a "fiber flavor" choice of multimode SC, ST, LC or MTRJ or single mode SSC, SSCL, SST or SLC connectors. (By default factory settings is at "Full" duplex on fiber ports)

LED Indicators (Front)

POWER: Steady ON when power applied

10/100: Steady ON for 100Mbps; OFF for 10 Mbps(copper ports only)

LK/ACT: Steady ON for LINK (LK) with no traffic, BLINKING indicates port is transmitting / receiving (ACT).

F/H: Steady ON for full-duplex, OFF for half-duplex (Fiber port only)

Mounting options

Metal mounting clips for panel mounting: included

DIN-Rail mounting option: Model # DIN-RAIL MC2 (see Section 3.4)

Rack-mount option: MC14-TRAY, see http://www.garrettcom.com/mc_tray.htm

Depth: 6.0", width: 17" Height: 2.25" (15cm D x 43cm W x 5.7cm H)

Mean Time Between Failure (MTBF) – over15 years, Telcordia (Bellcore) Method

Agency Approvals and Standards Compliance:

UL Listed (UL 60950), cUL, CE, Emissions meets FCC Part 15 Class A.
NEBS L3 and ETSI compliant.

H and P models: IEEE P1613 Env. Std for Electric Power Substations
P models: NEMA TS-2 and TEES for traffic control equipment
P models: designed for UL 2043 above-the-ceiling installation
IEC61850 EMC and Operating Conditions Class C Power Substations

Warranty: Three years, return to factory Made in USA

1.2 Summary of models and descriptions:

Note: The ES42 model # consists of the base unit type and the power input. Insert S for sgl-mode , the fiber flavor (2ff) and the power input. H- hardened, P-premium, R- Din –Rail MC2, d-domestic, i – international power type.

The "2ff" field is for selection of the desired "fiber flavor" as listed below. The 1ff (one fiber +five RJ-45 ports) and no ff (six RJ-45 ports only)models are also same as below, except the port options.

ES42 Models (four RJ-45 10/100 with two100Mb fiber flavor option).

ES42-2ff-d or -i = four 10/100 RJ-45+ two 100Mb ST Fiber port for office and wiring closet (0 to 40C) using an external AC power supply.

ES42H-2ff-Hd, Hi = Hardened (H), four RJ-45+ two 100Mb Fiber port for factory floor (-25 to 60C) using a direct DC (8-15VDC) and/or external AC hardened power supply (included).

ES42H-2ff-12VDC = Same as ES42H model, except AC hardened power supply is not included

ES42H-2ff-24VDC = Same as ES42H-12VDC model, except 24VDC power input replaces 12VDC.

ES42HR-2ff-24VDC = Same as ES42H-24VDC model, but includes DIN-RAIL-MC2 mounting

ES42H-2ff-48VDC = Same as ES42H-24VDC model, except -48VDC power input replaces 24VDC.

ES42P-2ff-Pd, Pi = Premium (P), two 10/100 RJ-45+ one 10Mb Fiber port for un-controlled(outdoor) (-40 to 75C) using direct DC (8-15VDC) and/or external AC premium power supply (included).

ES42P-2ff-12VDC = Same as ES42P-Pd, Pi, except AC Premium Power Supply is not included.

ES42P-2ff-24VDC = Same as ES42P-12VDC model, except 24VDC power input replace 12VDC.

ES42PR-2ff-24VDC = Same as ES42P-24VDC model, but includes DIN-RAIL-MC2 mounting opt.
ES42P-2ff-48VDC = Same as ES42P-24VDC model, except -48VDC input replaces 24VDC.

Note: For dual source 24V power input to DC jack, order Model# DUAL-SRC-24Kit

"SC" = 100Base-FX-SC: multi-mode fiber optic with SC type connector, 2km.
"SSC"= 100Base-FX-SSC: single-mode fiber optic with SC type connector, 20km.
"SSCL"= 100Base-FX-SSCL: single-mode fiber optic with SC type connector, 40km.
"ST" = 100Base-FX-ST: multi-mode fiber optic with ST type connector, 2km.
"SST" = 100Base-FX-ST: single-mode fiber optic with ST type connector, 20km.
"SLC"= 100Base-FX-SLC: single-mode fiber optic with LC type connector, 15km.
"MTRJ"= 100Base-FX-MTRJ: multi-mode fiber optic with MTRJ type connector, 2km.
"SLC"= 100Base-FX-SLC: single-mode fiber optic with LC type connector, 15km.
"SFC"= 100Base-FX-SFC: single-mode fiber optic with FC Screw type connector, 20km.
"SSCX"= 100Base-FX-SSCX: single-mode fiber optic with SC type connector, 100km.

Accessories

MC14-TRAY = 19" Rack-mount tray for 14-series Switch models, up to 16 units
Other Tray configurations with power supplies and power cabling included - See Section 3.3
DUAL-SRC-24KIT= Cable kit for 24VDC input power input jack for one ES42, any 24VDC model
DIN-RAIL-MC2 = Metal DIN-Rail mounting bracket for one ES42 Series Switch,
See Section 3.4
Conformal Coating (for high humidity and "tropical" applications) - request quote.

2.0 INTRODUCTION

This section describes ES42 Series models, including appearance, features and typical applications.

2.1 Inspecting the Package and the Product

Examine the shipping container for obvious damage prior to installing this product; notify the carrier immediately of any damage which you believe occurred during shipment or delivery. Inspect the contents of this package for any signs of damage and ensure that the items listed below are included.

This package should contain:

1	MagnumES42Series Edge Switch unit,
1	External Power Supply, (for -d, -i, -Hd, -Hi, -Pd and -Pi models only)
1 set	Metal panel mounting clips and screws (2 each)
1	User Guide (this manual)

Remove the Magnum ES42 Series Edge Switch from the shipping container. Be sure to keep the shipping container should you need to ship the unit at a later date. In the event there are items missing or damaged contact your supplier. If you need to return the unit use the original shipping container. Refer to Section 5 Troubleshooting, for specific return procedures.

2.2 Product Description

Magnum ES42 Series Switches are designed as an Ethernet edge solution in heavy-duty industrial, military and un-controlled temperature applications, as well as an economical solution for the growing requirements of managed networks. ES42, a *six port* versatile family of compact Edge switches, loaded with factory configurable fiber options and AC/DC power input options with Alarm terminal block and innovative packaging is ready to serve the needs of edge-of-the network applications.

The Magnum ES42 family of Edge Switches have a wide breadth of port configurability and fiber port type options - six 10/100 copper ports or four 10/100 copper

ports and two 100 Mb Fiber port or five copper ports with one 100Mb Fiber port built in, covers the full range of application environments, with regular (office), Hardened (factory floor), and Premium-rated (outdoor) versions. Extra features for heavy-duty and extended temperature operation ranges are included selectively in the Hardened factory-floor and Premium-rated outdoor models. The breadth of models and flavor of fiber port types offers the best price-to-value ratio for each user and installation. The compact package is ideal for network edge installations, and is able to be conveniently Din rail mounted to suit any application.

The Magnum Edge switches include Link-Loss-Learn(LLL) feature (factory configurable on ports 1 and 2 to qualify for any redundant and self-healing managed network structures. The Link-Loss-Feature in ES42 allows the Edge switches to flush the internal address buffers in milliseconds to permit a quick change in LAN packets flow, and

pass the reconfiguration signal down the line to other ring switches in the redundant structure for faster recovery. Magnum Edge switches, combined with other Magnum managed switches, running STP/RSTP or S-Ring, can often provide high availability Redundant LANs at economical cost.

The Magnum ES42 regular-package units are for office and indoor wiring closet environments. These are the economical base units in the ES42 Switch family. An external AC power supply for either North America (-d, 115vac 60Hz) or international (-I, 230vac, 50Hz) is included. The ambient temperature rating is 0°C to 40°C, office grade.

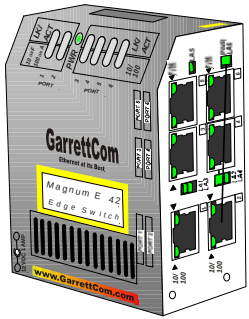
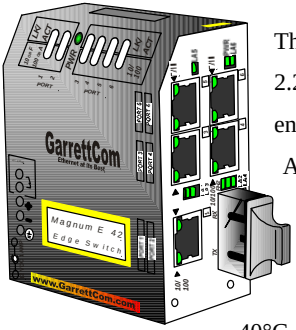


Fig 2.2a ES42 with SIX 10/100 RJ-45 only

A robust metal case with convection cooling is featured. Metal mounting clips are included, and rack-mount tray options are available.



The YELLOW labeled Magnum ES42 models (as shown in Fig 2.2.a, b, c) units are for office and wiring closet environments and use an external AC power supply. A ventilated metal case for convection cooling is featured. Ambient operating temperature is 0° to 40°C. Storage temperature rating is -40°to 85°C. Metal clips are included for secure panel

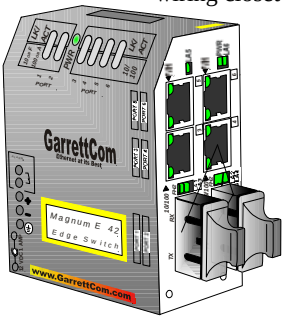
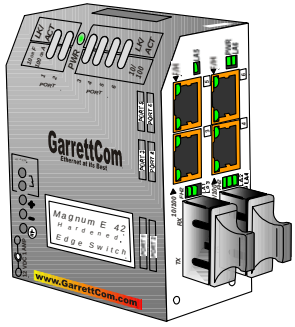


Fig 2.2b,c (ES42-1ff) with four10/100 RJ-45 and one & two 100Mb Fiber(ES42-2ff)

mounting and optional DIN-Rail mounting. The regular model ES42 also has a rack-mount option via an MC-TRAY.

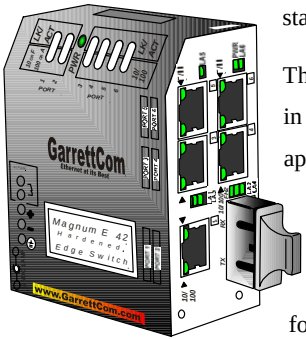
The regular model, ES42, includes Link-Loss-Learn, MDIX ports and the full range of fiber port options. The regular ES42 model does not have options for Alarm and DC power.



The Magnum ES42H Hardened units are for factory floor applications. The ES42H models are built with high-grade components and are constructed using special thermal techniques and a metal case for

Fig. 2.2.d Hardened ES42H-2ff

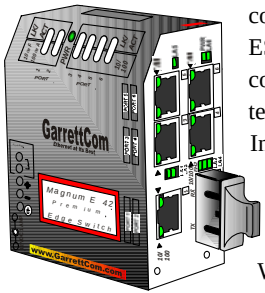
heavy duty industrial jobs. In addition to a Hardened AC power option and jack, terminals for internal DC power choices at 8 to15V, 24V or -48V DC are included. The ambient temperature rating of –25 to 60C is for industrial use. No internal air flow is required for cooling, so it resists dust, dirt, moisture, smoke and insects. Mounting options include stand-alone panel-mounting, DIN-Rail, or rack-mount tray.



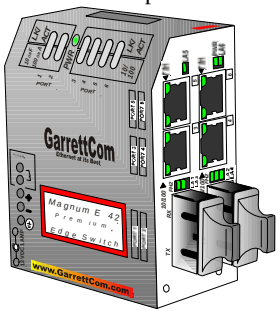
The ORANGE labeled Magnum ES42H hardened units (shown in Fig 2.2d & e) are designed for factory floor/Industrial applications. Using special thermal techniques and a sealed rugged metal case for heavy duty industrial applications, the ES42H requires no air inflow for cooling, so the ES42H resists dirt, moisture, smoke and insects. Choices of models for external

Fig. 2.2e Hardened ES42H-2ff

AC or internal DC power are available. Ambient operating temperature is –25°C to + 60°C depending on the power source used. Storage temperature rating is –25°C to + 85°C.



The RED labeled Magnum ES42P Premium-rated units are for temperature un-controlled applications (-40 to 75°C), typically located outdoors. The ES42P models are built with premium-grade extended temperature components, and use similar thermal techniques as the ES42H Hardened units. In addition to a Premium-rated AC power option and jack, terminals for internal DC power choices at 8 to15V, 24V or -48V DC are included. When used outdoors, the ES42P should be protected from rain. Mounting options include stand-alone panel-mounting, DIN-rail, or rack-mount tray. **Fig 2.2f & g, Premium model ES42P-1ff & ES42P-2ff**



The ES42P series (as shown in Fig. 2.2f & g) are premium rated units suitable for temperature un-controlled outdoor applications. Specially designed with premium-grade extended temperature components, the ES42P units use similar thermal techniques to the ES42H hardened units for cooling. Mounting options include panel-mounting, DIN-rail, or rack-mount tray. Choices of models for external AC or internal DC power are available. Ambient operating temperature is between –40°C to +75°C depending on the power source used. Storage temperature rating is between –40°C to +85°C.

All the premium and hardened models also come along with hardware operated Alarm terminal block for providing extra reliability to the unit. The Alarm feature allows the ES42H & P users to be aware and to monitor any internal power failure. See section 44 for details.

The front side of the unit has four/five twisted-pair 10/100Mb switch ports and one/two 100Mb fiber port. All the RJ-45 ports of the ES42 Series Edge switches support

auto-cross (MDIX) operation under auto-negotiation mode. The ES42 series provides switching among four 10/100 auto-negotiating copper ports and two 100Mb fiber ports which may be SC, ST, MTRJ or LC multi-mode or single-mode. The ES42's breadth of fiber options and well as temperature options provide many networking options and solutions in a very small footprint.

Two sets of LEDs to indicating the operating status of ports are mounted on the top and front (for extra viewing advantage while rack-mounted). For each port, there are Link and Activity (LK/ACT) LED's on the top indicating that the media cables are connected correctly and showing, by blinking, when there is traffic. The LK/ACT LED's are repeated on the front as 1 (port 1)…6 (port 6), whereas on the side as LA1…LA6 . There is another set of LEDs on the front for 10 or H and 100 or F, to indicate the data rate as well as a set to indicate duplex for ports 1 and 2 only. 10/100 indicates the speed for copper ports, whereas F/H indicates Full and Half duplex for fiber ports only.

There is a power (PWR) LED to indicate that the unit is turned ON. The fiber ports on the ES42 Edge switches are multi-mode or single-mode with an SC, ST or small form factor connector (MTRJ multi mode or LC single-mode).

The external DC power plug connector and/or “jack” and the internal DC input terminal is provided on the rear of the unit.

2.3 Frame Buffering and Latency

The Magnum ES42 Series Edge Switches are store-and-forward switches. Each frame (or packet) is loaded into the Switch’s memory and inspected before forwarding can occur. This technique ensures that all forwarded frames are of a valid length and have the correct CRC, i.e. they are good packets. This eliminates propagation of bad packets, enabling all of the available bandwidth to be used for valid information.

While other switching technologies such as "cut-through" or "express" impose minimal frame latency, they will also permit bad frames to propagate to the Ethernet

network. The "cut-through" technique permits collision fragment frames, which are a result of late collisions, to be forwarded--which add to the network traffic. There is no way to filter frames with a bad CRC (the entire frame must be present in order for CRC to be calculated). Since collisions and bad packets are more likely when traffic is heavy, store-and-forward switch technology enables more bandwidth to be available for good packets when the traffic load is greatest.

To minimize the possibility of dropping frames on congested ports, each Magnum ES42 Series Edge Switch dynamically allocates buffer space from 128KB memory pool, ensuring that heavily used ports receive very large buffer space for packet storage. (Many other switches have their packet buffer storage space divided evenly across all ports, resulting in a small, fixed number of packets to be stored per port. When the port buffer fills up, dropped packets result.) This dynamic buffer allocation provides the capability for the maximum resources of the Magnum ES42 Series unit to be applied to all

traffic loads, even when the traffic activity is unbalanced across the ports. Since the traffic on an operating network is constantly varying in packet density per port and in aggregate density, the Magnum ES42 Series Edge Switches are constantly adapting internally to provide maximum network performance with the least dropped packets.

When the Switch detects that its free buffer queue space is low, the Switch sends industry standard (full-duplex only) PAUSE packets out to the devices sending packets to cause "flow control". This tells the sending devices to temporarily stop sending traffic, which allows a traffic catch-up to occur without dropping packets. Then, normal packet buffering and processing resumes. This flow-control sequence occurs in a small fraction of a second and is transparent to an observer.

Another feature implemented in Magnum ES42 Series Edge Switches is a collision-based flow-control mechanism (when operating at half-duplex only). When the Switch detects that its free buffer queue space is low, the Switch prevents more frames from entering by forcing a collision signal on all receiving half-duplex ports in order to stop incoming traffic.

The latency (the time the frame spends in the Switch before it is sent along or forwarded to its destination) of the ES42 Series Edge Switches varies with the port-speed types. The length of the frame is a variable as it is with all store-and-forward switches. For 10 Mb-to-10 Mb, 10 Mb-to-100Mb or 100Mb-to-10 Mb forwarding, the latency is 15 microseconds plus the packet time of 10 Mb. For 100Mb-to-100Mb forwarding, the latency is 5 microseconds plus the packet time of 100Mb.

2.4 Features and Benefits

- **Full 100Mb or 10 Mb switching services for high performance Ethernet**
  Magnum ES42 Series Switches provide Fast Ethernet switching on all ports. They perform high speed filter/forward operations on the traffic, giving each port's segment a full 100Mb (or 10 Mb) of bandwidth.

- **Reduces Network Costs and provide economical solution**

  Magnum ES42 Series Switches offer the ideal solution to efficiently and inexpensively connect a Twisted Pair and fiber network with 10Mb or 100Mb and help to expand the Ethernet network in a very convenient and economical way.

- **Choice of one or two100Mb Fiber option, more efficient** Designed as a multi-purpose media Edge Switch, the 100Mb fiber port allows the user to convert the media from copper to fiber and the other RJ-45 port can be used as diagnostic port or for more connectivity.
- **Installation is "Plug and Play", operation is transparent to software** The Magnum ES42 Series Switches operate as hardware switches, only forwarding those packets from each domain that are needed on the other domains. Internal address tables are self-learning, enabling users to change port connections or 10/100 domains without affecting operations.
- **Two sets of LEDs for viewing status from any angle.** Each ES42 Series Edge Switch is equipped with two sets (front and side) of LEDs to provide status information when viewed at almost any angle or mounting arrangement whether rack (MC14- Tray) or Din-Rail mounted**.**
- **Rugged metal case, Industrial grade** ES42 Series have a robust design and are packaged in a rugged sheet metal enclosure to ensure high reliability and durability even when placed in industrial or outdoor applications.

- **Qualified to use for temperature un-controlled "outdoor" application**

  The Magnum ES42P Premium rated versions of Edge Switches have an ambient temperature rating between –40°C to +75°C for DC models and qualify for temperature un-controlled "outdoor" application.

- **Efficient Compact design, for all purpose convenient mounting**

  Featuring a compact steel case with an external AC and internal DC power supply, Magnum ES42 Series of Edge Switches can be installed in small spaces in cabinets, on table tops, in racks, walls or DIN-Rail mounted and in trays such as the Magnum MC14-TRAY.

- **MDIX ports to eliminate cross-over cable while cascading** All the Magnum ES42 Series Switches are featured with MDIX (auto-cross), which easily allow cascading with other Switch, Hubs or media Edges without using the cross-over cable.

- **Hardware operated Alarm terminal block for ES42H and ES42P**

  The Alarm contact option on ES42H and ES42P enables monitoring for internal power failure, and provides extra reliability to the hardened Switch

- **Link-Loss-Learn feature for faster recovery in redundant managed network**

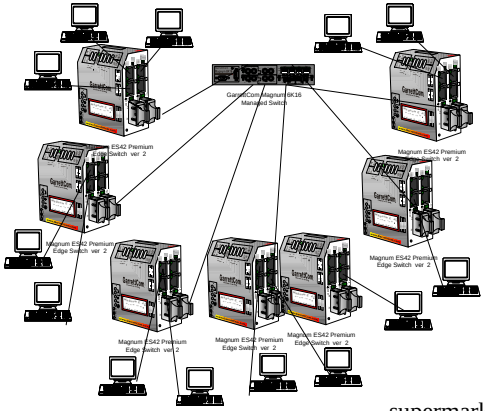
  The LLL feature qualifies the Edge switches to actively work along with redundant network structure as a client switch and allow a faster recovery during ring break.

2.5 Applications for ES42 Series Edge Switches

Available in three "hardiness" models (Yellow - "office/wiring closet", Orange – "Hardened", Red- "Premium rated (outdoor)"), and hundreds of port-type combinations, Magnum ES42 Series Edge Switches fit very well in almost any environment to enable users to scale their networks quickly and cost effectively. The edge-of-the-network connectivity solutions offered by Magnum Edge Switches provide convenient, economical, and reliable solutions as well as an active role on the managed redundant network setup for faster recovery. The compact Magnum ES42 Series assists fast expanding network

requirements via providing edge support and reliability to the managed redundant network. The Dual-Speed and Dual-media functions support a mixed environment of 10 Mbps and 100Mbps users with copper and fiber media. The switched full duplex fiber port also provides high bandwidth and longer distance support. The up-link feature of 100Mb fiber on Ports 1 and 2 enable easy expansion for the on-going demand of Ethernet networks. The 10/100Mbps auto-negotiating MDIX copper ports and the breadth of 100Mbps fiber ports enable easy interfacing with existing cable plant and equipment. Models of ES42 Edge Switches are available for even the most extreme temperatures. The ES42's rugged case provides extra support in the harshest industrial environments. Link-Loss-Learn is an additional feature to provide the extra reliability to the redundant network and an economical solution for faster recovery, during the ring break.

Example1. Supermarket application for ES42



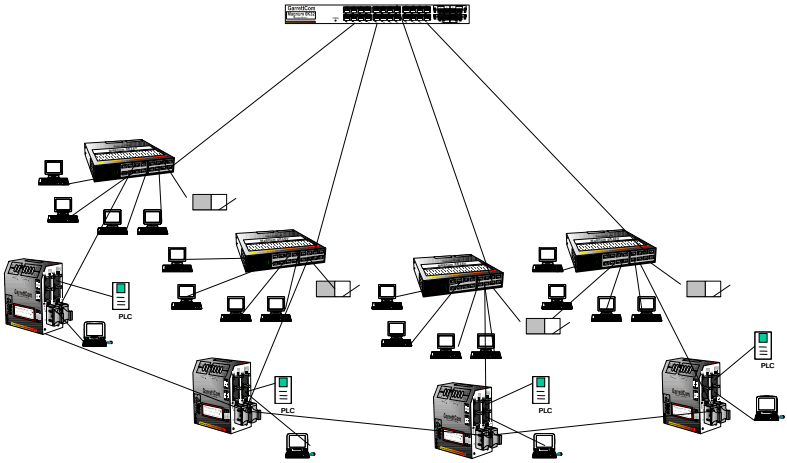
In this example, the supermarket required a Data Mining function to store all the transaction with an ongoing demand to expand the network.

This need can be easily met using the economical Magnum ES42 Edge Switch. Additional functionality includes the ability to transfer data across large distances with multi- or single–mode fiber while securing the LAN from EMI and wire tapping.

The ES42's six ports in a small, reliable enclosure provide an effective solution to for transferring real-time transactions from the store to the storage device in the control room. The easily deployable through Din-rail option and the dual power source of flexibility along with flavor of fiber option for distance, the ES42 easily meets all the requirements of supermarket. The plug-n-play ES42 not only provides a reliable solution but also reduces operational costs significantly.

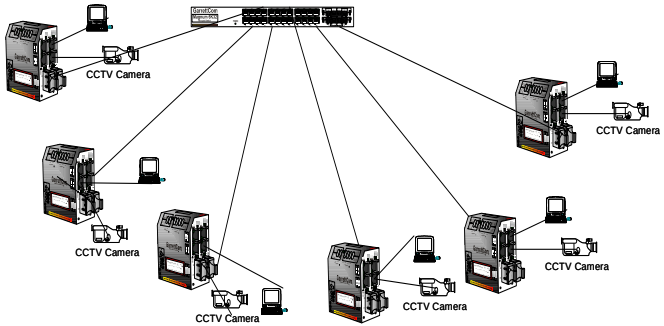
Example 2: ES42H and CSN14H

In this industrial networking application, the new PLC units are deployed on a network expansion, and each PLC required one (or two for redundancy) Ethernet ports to carry status and control data to the control center. The ES42H and CS14H provide a good solution with their multiple options and hardened features. The two Fiber ports on the Edge switches are ideal for secure data communications over long distances. Built with high-grade components, efficient cooling techniques and having no openings for dirt to enter, the ES42 Series Edge Switches provide the very effective solution for this need. The CS14H offers additional and affordable fiber connectivity to the ES42H where needed.



ES42H in a Industrial application

Example 3: ES42P: In this example, the Magnum ES42P premium Edge Switches are deployed to serve as a secure corporate or transportation surveillance system. CCTV cameras may be spread out over many miles in temperature un-controlled locations and with pan, tilt and zoom (PTZ) controlled through an Ethernet copper port .The premium Edge Switches provide two fiber segments for secure long distance (2-40km) communication while being installed in temperature un-controlled cabinets and allowing a full range of AC and DC power options. The four copper ports at the remote location provides access for other Ethernet equipment such as motion detectors or will act as a test port for maintenance personnel with up-link for access to a central LAN and central file servers.



ES42p in a Outdoor application

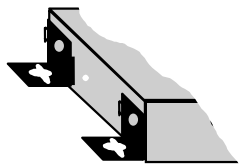
The ideally suited ES42P with its diversified features, premium rated approvals and cost-effective solution, make an ideal choice in outdoor environments.

3.0 INSTALLATION

This section describes the installation of the Magnum ES42 Series Edge Switches, including location, mountings, power supply options and media connection.

3.1 Locating the Edge Switch Unit

All the ES42 Series Switches operate in transparent half-and full-duplex mode. The store and forward switch easily takes care of network traffic and can be used as a useful, economical tool to expand an existing network.

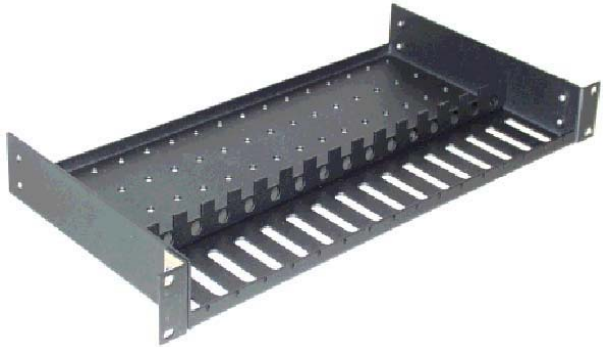


Secure attachment of clips for panel -

The compact and lightweight design of the Magnum ES42 Series allows it to be easily installed in almost any location. A Velcro strip may be used for mounting the unit on a vertical surface such as a wall or cabinet, or for securing the unit on a table-top or shelf. Alternatively, metal mounting clips and screws are included for a rugged and secure mounting in any orientation.

Installation of the Magnum ES42 Series Edge Switches is a simple procedure. The installation location is dependent upon the physical layout of the Ethernet network and associated cabling. Make sure the unit is installed in a location that is easily accessible to an AC power outlet or the appropriate DC source and where cooling is not inhibited. The green Power (PWR) LED must turn ON when power is applied.

3.2 MC14-TRAY for Rack Mounting of ES42 Series Switches



For 19" rack-mounting of Magnum ES42 series Edge Switches, a rack-mount tray is available, the MC14-TRAY. The Edge Switches are mounted with the DC power jack in the back, with the fiber and the RJ-45 connectors in the front. Any mix of the Edge Switches and/or

Media Edges may be placed on a tray, up to a maximum of 8 units. (The mounting spaces of the MC14-TRAY are specific to the Magnum products and will not permit other models to be properly mounted).

In a typical installation, the MC14-TRAY, 19" rack-mount tray will hold a few (three to eight) ES42 Series Edge Switches, with their power supplies plugged into power strips (not included) in the rear area of the tray. Metal mounting screws in the bottom-front hold the Edge Switches firmly in place. The beveled-top edge of the units permits the LEDs of each unit to be viewed for operational status, even when the units are very close together.

3.3 MC14-TR+PS9 and MC14-TR+PS9X2 for Rack Mounting Media Edges

The MC14-TR+ PS9 and MC14-TR+PS9X2 are other options for rack mounting the mix of Magnum 10Mbps and 100Mbps Edge Switches and Media Edges together in a 19" rack-mount tray. These models come with built-in common universal AC power supply rated at 55 watts at 50°C ambient,9VDC output, and supporting up to 2-3 Switches for MC14-TR+PS9 and 5 units ES42 Series for MC14-TR+PS9X2. The MC14-TR+PS9X2 Model

has two groups of eight units per power supply. The power supplies have auto-ranging AC input for use worldwide.

The side-view < here is an example of an installation of the model MC14-TR+PS9, 19" rack-mount tray, holding a few ES42, and 14E Media Edges, each with their power input plugged into the built-in common AC power supply in the rear area of the tray. (AC PS units that come with the office models of the Edge Switch's are not used). Because of the thicker size, only eight ES42 units can fit in one MC14-TRAY.

Metal mounting screws in the bottom-front hold each of the Edge Switches, securing them in the tray and enabling separate removal for service. The dual LEDs permit viewing of Edge Switch status from any angle.

3.4 DIN-Rail mounting option

The Magnum ES42H and ES42P Edge Switches, designed for use in "Factory Floor" Industrial Ethernet environments, are available for DIN-Rail mounting in an enclosure having DIN Rails

A Magnum ES42H is shown alongside the DIN-Rail-MC2 bracket here ->

The metal DIN-Rail mounting hardware is optional and needs to be ordered as a separate item, e.g. Model #DIN-RAIL-MC2. It comes with four screws to attach the bracket to the MC unit. The rail clip is spring-loaded with a pull-up latch at the top for easy "snap-on" attachment and removal.

The Magnum ES42 models with "HR" have 24VDC power, and have the DIN-Rail-MC2 bracket included and assembled with the MC unit at the factory.

3.5 Power Requirements, Power Supply Types for ES42 Series Switches

Magnum ES42 Series Switches are power-efficient and can work with an external AC power supply. Magnum ES42 Series require a nominal 12VDC input version. The extended temperature (H and P) versions are used for heavy duty industrial applications.

The 12V DC power input jack has a plug of 2.5mm, center +ve , with 6 ft. cord. All the AC power supply info detail is provided in Technical Specs Section 1.1.

The ES42 Series are designed to be used with UL listed Class II power supplies.

ES42H or P with 12VDC/ 24VDC/ -48VDC

The ES42 Edge Switches provide reliable operation,

withstand higher temperature environments, and provide the DC power choices to the user to deploy in uncontrolled temperature environments.

The Direct DC (Internal) 12V DC (8 – 15V DC) has a built-in terminal block for +, -, ground. The 9V DC jack is also present. Detail information about the 12 VDC, the 24V DC and the –48V DC is provided in the Technical Specifications Section 1.1.

The various models of DC power type and extended ambient temperature power supplies are numerous and your choice needs to be called out on your order.

Note: When connected to a -48 V centralized dc source these products are to be installed only in Restricted Access Areas (dedicated equipment rooms, electrical closets or the like).

3.6 Powering the ES42H and ES42P (DC internal) with 12V, 24V or –48VDC power input

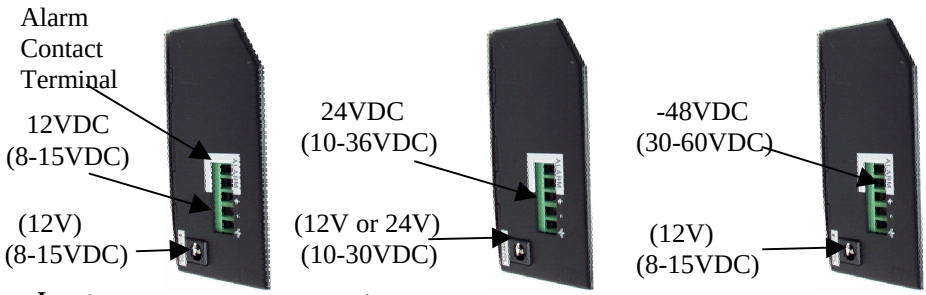
Each Magnum ES42H/ES42P-Series is equipped with an internal DC power supply, and has built-in screw terminals for secure attachment of the power input leads. Three DC power models support a range of power input types. The three DC power input terminal block choices are for use with 12VDC, 24VDC or -48VDC power. Where an AC power adaptor is used, DC is supplied via the jack. Power input from the DC terminal block and the jack and both may be connected simultaneously for power input redundancy.

<u>Note:</u> The ES42H or P models with 24VDC support the Dual Source 24V input option. An external Dual-SRC-24KIT (SHOWN AT RIGHT…and sold separately, or a customer-supplied equivalent) can be used to input 24VDC power to the ES4H or P unit via the jack. This is for 24VDC models only.

3.6 continued, DC Power Terminals: "+", "-", gnd

GND: Terminal for "earth" or ground wire connection to the ES42H chassis

Input Voltage: **12VDC** **24VDC** **-48VDC**



Input current:

0.8 amp.(12V DC)

0.4 amp max.(24V DC)

0.2 amp max.(-48V DC)

Power Consumption: 7 watts typical, 9 watts max.

3.7 ES42H and P Series, DC-powered, 12VDC, 24VDC and -48VDC Installation

This section describes the proper connection of the -48VDC leads (or 24VDC, 12VDC leads) to the DC power terminal block on the Magnum ES42H Edge Switch (as shown in the Figure)**.** The DC terminal block on the Magnum ES42H is located on the left side of the unit and is equipped with three (3) screw-down lead posts. The power terminals are identified as positive (+) and negative (-), and they are floating inside the unit so that either of the terminals may be grounded by the user if desired. The chassis is "earth" or ground (GND). The connection procedure is straightforward. Simply insert

the DC leads to the ES42H's power terminals, positive (+) and negative (-) screws. The use of Ground (GND) optional; it connects to the ES42H chassis. Ensure that each lead is securely tightened from the top, as shown on above picture with arrow.

NOTE: Always use a voltmeter to measure the voltage of the incoming power supply and figure out the +ve potential lead or -ve potential lead. The more +ve potential lead will connect to the post labeled "+ve" and the rest to the "-ve".

The GND can be hooked up at the last.

When power is applied, the green PWR LED will illuminate.

3.8 Connecting Ethernet Media

The Magnum ES42-Series Edge Switches can be connected to two media types i.e. fiber and copper (RJ-45) types, runt at 100BASE-TX, 10BASE-T and 100BASE-FX only. CAT 5 cables should be used when making 100BASE-TX connections. When the

ports are used as 10BASE-T ports, CAT 3 may be used. In either case, the maximum distance for unshielded twisted pair cabling is 100 meters (328 ft). For fiber port 10BASE-FL or 100BASE-FX multi-mode, 50/125 or 62.5/125 microns cabling can be used, whereas for single-mode, 9/125 microns cabling should be used. Fiber cabling supports much longer cable distance and higher bandwidths as compared to copper wiring.

Media	IEEE Standard	Connector
Twisted Pair (CAT 3 or 5)	10BASE-T	RJ-45
Twisted Pair (CAT 5)	100BASE-TX	RJ-45
Fiber (Multi-mode)	100BASE-FX	ST, SC
Fiber (Single-mode)	100BASE-FX	SC, LC
Fiber (Multi-mode)	100BASE-FX	MTRJ

NOTE : *It is recommended that high quality CAT. 5 cables (which work for both 10 Mbps and 100Mbps) be used whenever possible in order to provide flexibility in a mixed-speed network, since ES42-series switch ports are auto-sensing for either 10 and 100Mbps. Note that the auto-cross function does not operate, if the port is fixed or not supporting auto-negotiation.*

3.8.1 Connecting Twisted Pair (RJ-45, CAT 3 or CAT 5, Unshielded or Shielded)

The following procedure describes how to connect a 10BASE-T or 100BASE-TX twisted pair segment to the RJ-45 port. The procedure is the same for both unshielded and shielded twisted pair cables.

1. Using standard twisted pair media, insert either end of the cable with a RJ-45 plug into the RJ-45 connector of the port. Note that, even though the connector is shielded, either unshielded or shielded cables and wiring may be used.
2. Connect the other end of the cable to the corresponding device.
3. Use the LINK LED to ensure proper connectivity by noting that the LED will be illuminated when the unit is powered and proper connection is established. If this does not help, ensure that the cable is connected properly and that the device on the other end is powered and is not defective.
4. For Port # 1 or 1SW, if the LINK LED is not illuminated, move the switch which has a cross-over or up-link for linking to another hub or Switch.

3.8.2 Connecting Fiber Optic ST-type, "twist-lock"

The following procedure applies to installations using ST-type fiber connectors. This procedure applies to ports using multi-mode ST fiber connectors.

1. Before connecting the fiber optic cable, remove the protective dust caps from the tips of the fiber connectors. Save these dust caps for future use.
2. Wipe clean the ends of the dual connectors with a soft cloth or lint-free lens tissue dampened in alcohol. Make certain the connectors are clean before connecting.

   Note: ***One strand of the duplex fiber optic cable is coded using color bands at regular intervals; you must use the color-coded strand on the associated ports at each end of the fiber optic segment.***
3. Connect the Transmit (TX) port (light colored post) on the Magnum Fiber port to the Receive (RX) port of the remote device. Begin with the color-coded strand of the cable for this first TX-to-RX connection.
4. Connect the Receive (RX) port (dark colored post) to the Transmit (TX) port of the remote device. Use the non-color coded fiber strand for this.
5. The LINK LED on the front of the fiber connector will illuminate when a proper connection has been established at both ends (and when power is ON in the unit). If LINK is not lit after cable connection, the normal cause is improper cable polarity. Swap the fiber cables at the fiber connector to remedy this situation.

3.8.3 Connecting Fiber Optic SC-type, "Snap-In"

The following procedure applies to installations using SC-type fiber connectors, i.e., using multi-mode SC and SC single-mode. While connecting fiber media to SC connectors, simply snap on the two square male connectors into the SC female jacks of the Fiber connector until it clicks and secures.

3.8.4 Connecting Single-Mode Fiber Optic

When using single-mode fiber cable, be sure to use single-mode fiber port connectors. Single-mode fiber cable has a smaller diameter than multi-mode fiber cable (9/125 microns for single-mode, 50/125 or 62.5/125 microns for multi-mode where xx/xx are the diameters of the core and the core plus the cladding respectively). Single-mode fiber allows full bandwidth at longer distances, about 20Km with the multi-mode SC.

The same procedures as for multi-mode fiber apply to single-mode fiber connectors. Follow the steps listed in Section 3.8.2 above.

3.8.5 Power Budget Calculations for ES42 Series, Fiber Media

Receiver Sensitivity and Transmitter Power are the parameters necessary to compute the power budget. To calculate the power budget of different fiber media installations using Magnum products, the following equations should be used:

OPB (Optical Power Budget) = P_T(min) - P_R(min)

where P_T = Transmitter Output Power, and P_R = Receiver Sensitivity

Worst case OPB = OPB - 1dB(for LED aging) - 1dB(for insertion loss)

Worst case distance = {Worst case OPB, in dB} / [Cable Loss, in dB/Km]

where the "Cable Loss" for 62.5/125 and 50/125μm (m.m.) is 2.8 dB/km,

and the "Cable Loss" for 100/140 (Multi-mode) is 3.3 dB/km,

and the "Cable Loss" for 9/125 (Single-mode) is 0.5 dB/km

and the "Cable Loss" for 9/125 (Single-mode) is 0.25 dB/km (SSCX)

The following data has been collected from component manufacturer's (Agilent's, JDS-Uniphase, stratus, Lucents') web sites and catalogs to provide guidance to network integrators and installers-

Fiber Port Module	Speed, Std.	Mode	Std. km fdx (hdx)	Wavelength nm	Cable Size µm	X'mitr Output P_T, dB	R'cvr Sens. P_R, dB	Worst OPB, dB	Worst* distance Km, fdx	typical OPB, dB	typical* distance Km, fdx
ES42-MST, MSC	**100Mb FX**	Multi-mode	2 (0.4)	1310	62.5/125 50/125	-20 -23.5	-31 -31	9.0 5.5	2.5 2.0	14 12	5 4
ES42-SSC	**100Mb FX**	Single-mode	20 (0.4)	1310	9/125	-15	-31	14	28	17.5	35
ES42-MTRJ	**100Mb FX**	Multi-mode	2 (0.4)	1310	62.5/125 50/125	-20 -23.5	-31 -31	9.0 5.5	3.0 2.0	15.8 12.2	5.5 4.0
Long Reach	**100Mb FX**	Single-mode	40 (0.4)	1310	9/125	-5	-34	27	54	32.5	65
ES42-LC	**100Mb FX**	Single-mode	15+	1310	9/125	-15	-28	11	22	-	-
ES42-SSCX	**100Mb FX**	Single-mode	100	1550	9/125	-5	-35	28	112	-	-
ES42-SFC	**100Mb FX**	Single-mode	20 (0.4)	1310	9/125	-16	-32	14	28	-	-

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**** Note:*** *The use of either multi-mode or single-mode fiber to operate at 100Mbps speed over long distances (i.e., over approx. 400 meters) can be achieved* **only** *if the following factors are both applied:*

- *The 100Mb fiber segment must operate in full-duplex (FDX) mode, and*
- *The worst-case OPB of the fiber link must be greater than the fiber cable's passive Attenuation.*

(Attenuation = Cable loss + LED aging loss + Insertion loss + safety factor)

3.8.6 Connections to NICs which support Auto-Negotiation, RJ-45 ports

The copper ports of Magnum ES42-Sereis Edge Switches will function properly with NICs (Network Interface Cards) which support Auto-Negotiation, and the Fast Link Pulse (FLP) coding for the 100BASE-TX signaling system. When connecting a NIC to the ES42-Series, it may be necessary to reload the NIC drivers on the user device if the NIC has been communicating with a protocol other than 100BASE-TX (such as 10BASE-T). When 100Mb operation is agreed and in use, the 10/100 LED is illuminated steady ON and is OFF, if 10 Mbps traffic.

4.0 OPERATION

4.1 Dual-Speed Functionality, and Switching

The Magnum ES42 Series Edge Switches provide SIX switched ports with combination of fiber and copper or copper only. The architecture supports a dual speed switching environment, with standard auto-negotiation capability.

The switched RJ-45 ports are full- or half-duplex auto-sensing for mode and speed, and auto-cross for plug polarity. (See Section 4.2). When the connected device is 10 Mbps, the ES42s obeys all the rules of 10 Mbps Ethernet configurations. The 10 Mbps users can “communicate” with 100Mbps users as well as other 10 Mbps users through the switch. Similarly, the 100Mbps traffic obeys the rules of 100Mbps Ethernet, and can communicate with 10 Mb and 100Mb users. Magnum ES42 Series units are plug-and-play

devices. There is no software configuring to be done at installation or for maintenance, even for the LLL ports. The internal functions of both are described below.

Switching, Filtering and Forwarding

Each time a packet arrives on one of the switched ports, the decision is taken to either filter or to forward the packet. Packets whose source and destination addresses lie on the same port segment will be filtered, constraining them to one port and relieving the rest of the network from processing them. A packet whose destination address is on another port segment will be forwarded to the appropriate port, and will not be sent to the other ports where it is not needed. Packets needed for maintaining the operation of the network (such as occasional multi-cast packets) are forwarded to all ports. The Magnum ES42 Series Edge Switches operate in the store-and-forward switching mode, which eliminates bad packets and enables peak performance to be achieved when there is heavy traffic on the network.

Switching, Address Learning

The Magnum ES42 Series units have address table capacity of 2K node addresses, and are suitable for use in large networks. They are self-learning, so that as

nodes are added or removed or moved from one segment to another, the ES42- Series switch automatically keeps up with node locations.

An address-aging algorithm causes least-used addresses to fall out in favor of new frequently-used addresses. To reset the address buffer, cycle power down-and-up.

4.2 Auto-cross (MDIX), Auto-negotiation and Speed-sensing

The RJ-45 ports support auto-cross (MDI or MDIX) in the auto-negotiation mode according to the IEEE 802.3u standard. No crossover cables are needed on RJ-45 port, when connecting the ES42 to other unmanaged switches, legacy hubs, managed switches, media-converter etc. Please note that there can be conditions with managed switches where the switch manager fixes the port settings via software, and the result of the auto-negotiation is changed in the managed switch by the manager commands. In such cases, the 10/100 speed or the F/H mode may be affected, but auto-cross in the ES42 will still work. The auto-cross function cannot be disabled.

When an RJ-45 cable connection is made, and each time LINK is enabled, auto-negotiation takes place (except for legacy products, which do not have auto-negotiation and which go to the default state accordingly). The Magnum ES42 Switch advertises its capability for 10 or 100 Mbps speed and F/H duplex mode, and the device

at the other end of the cable should similarly advertise / respond. Both sides will agree to the speed and mode to be used per the IEEE 802.3u standard. Depending upon the devices connected, this will result in agreement to operate at either 10 Mbps or 100Mbps speed, and full- or half-duplex mode.

4.3 Dual LEDs, Front-panel and side-panel (Magnum ES42 Series)

LED **Description**

PWR Illuminates GREEN to indicate power applied.

LK/ ACT Steady ON for LINK w/no traffic, blinking for activity per port. LINK will turn off in the event connectivity is lost between the ends of the twisted pair segment or a loss of power occurs in the unit or remote device. The Link ports are also represented by LA1, LA2, LA3…LA6. (Steady On or steady Off indicates no Receive Activity).

10/100 Steady ON for 100Mb speed, OFF for 10Mb speed per port (copper ports)

F/H (FH1, FH2) Steady ON for Full duplex (F/D) mode, OFF for Half duplex (H/D) mode per port (For fiber port only)

NOTE: The port#1 and 2 is being assigned for copper or fiber port for different models. On all copper 10/100 ports model (e.g ES42-d), the LEDs 10 or 100 denotes for copper port only. For the model 4copper +2 fiber or 5copper +1fiber,(e.g ES42H-ff-Hd) the F or H denotes for fiber port only.

4.4 Hardware operated Alarm Contact for monitoring internal power supply

The two screws Alarm Contacts feature, standard on Magnum ES42H and P, provides Normally Closed (NC) contacts to which the user can attach one sets of status monitoring wires at the green terminal block. When this option is present, the terminal block for Alarm Contacts is part of the Power Input panel in the Magnum ES42s case. The DC power input connection is in the same panel.

The NC Alarm Contact is held close when there is power on the main board inside of the ES42. This provides a "Hardware operated Alarm" because the NC contacts will open when internal power is lost, either from an external power down condition or by the failure of the power supply inside of the Magnum ES42 Switch.

Useful info about Alarm Contacts in ES42H and ES42P:

1. Two-position terminal block (1,2) provided next to the DC power input, as shown above.
2. The Alarm Relay contact connected to the two terminals (1,2) is hardware operated.
3. By default it is NC (normally closed). It will open if there is any loss of power to the electronics inside of the unit.

5.0 TROUBLESHOOTING

All Magnum Ethernet products are designed to provide reliability and consistently high performance in all network environments. The installation of Magnum ES42 Series 10/100 Mb/s Switches is a straightforward procedure (see INSTALLATION, Section 3.0); the operation is also straightforward and is discussed in Section 4.

Should problems develop during installation or operation, this section is intended to help locate, identify and correct these types of problems. Please follow the suggestions listed below prior to contacting your supplier. However, if you are unsure of the

procedures described in this section or if the Magnum ES42 Series 10/100 Mb/s Switch is not performing as expected, do not attempt to repair the unit; instead contact your supplier for assistance or contact GarrettCom Customer Support.

5.1 Before Calling for Assistance

1. If difficulty is encountered when installing or operating the unit, refer back to the Installation Section of the applicable chapter of this manual. Also check to make sure that the various components of the network are interoperable.

2. Check the cables and connectors to ensure that they have been properly connected and the cables/wires have not been crimped or in some way impaired during installation. (About 90% of network downtime can be attributed to wiring and connector problems.)

3. If the fiber port does not link up while connecting to other device, do a quick Loop test to test the fiber transceiver is functional or not. Use a short patch cable of fiber and connect one end of cable to transmit and other end of receive to the fiber port transceiver. If the Link Led turns solid green, then the fiber port is functional and working.

4. Make sure that an AC power cord is properly attached to each Magnum ES42-Series unit. Be certain that the AC power cord is plugged into a functioning and appropriate electrical outlet. Use the PWR LEDs to verify each unit is receiving power.

5. If the problem is isolated to a network device other than the Magnum ES42 Series 10/100 Mb/s switch product, it is recommended that the problem device is replaced with a known good device. Verify whether or not the problem is corrected. If not, go to Step 6 below. If the problem is

corrected, the Magnum ES42 Series Switch and its associated cables are functioning properly.

6. If the problem continues after completing Step 5 above, contact your supplier of the Magnum ES42 Series 10/100 Mb/s Switch unit or if unknown, contact GarrettCom, Inc by fax, phone or email - (*support@garrettcom.com*) for assistance.

5.2 When Calling for Assistance

Please be prepared to provide the following information.

1. A complete description of the problem, including the following points:

   a. The nature and duration of the problem;
   b. Situations/Environment when the problem occurs;
   c. The components/devices involved in the problem;
   d. Any particular application that, when used, appears to create the problem;

2. An accurate list of GarrettCom product model(s)involved, with serial number(s). Include the date(s) that you purchased the products from your supplier.

3. It is useful to include other network equipment models and related hardware, including Convenient computers, workstations, terminals and printers; plus, the various network media types being used, along with diagram of network setup.

4. A record of changes that have been made to your network configuration prior to the occurrence of the problem. Any changes to system administration procedures should all be noted in this record.

5.3 Return Material Authorization (RMA) Procedure

All returns for repair must be accompanied by a Return Material Authorization (RMA) number. To obtain an RMA number, please use this URL -

https://rma.garrettcom.com/rma/rma_request_noaccount.php to fill out the form.

Please have the following information readily available:

Name and phone number of your contact person.

Name of your company / institution

Your shipping address

Product name

Serial Number (or Invoice Number)

Packing List Number (or Sales Order Number)

Date of installation

Failure symptoms, including a full description of the problem.

GarrettCom will carefully test and evaluate all returned products, will repair products that are under warranty at no charge, and will return the warranty-repaired units to the sender

with shipping charges prepaid (see Warranty Information, Appendix A, for complete details). However, if the problem or condition causing the return cannot be duplicated by GarrettCom, the unit will be returned as:

No Problem Found.

GarrettCom reserves the right to charge for the testing of non-defective units under warranty. Testing and repair of product that is not under warranty will result in a customer (user) charge.

5.4 Shipping and Packaging Information

Should you need to ship the unit back to GarrettCom, please follow these instructions:

1. Package the unit carefully. It is recommended that you use the original container if available. Units should be wrapped in a "bubble-wrap" plastic sheet

or bag for shipping protection. (You may retain all connectors and this Installation Guide.)

CAUTION: Do not pack the unit in Styrofoam "popcorn" type packing material. This material may cause electro-static shock damage to the unit.

2. Clearly mark the Return Material Authorization (RMA) number on the outside of the shipping container.
3. GarrettCom is not responsible for your return shipping charges.

4. Ship the package to:

GarrettCom, Inc.
47823 Westinghouse Dr.
Fremont, CA 94539
Attn.: Customer Service

APPENDIX A: WARRANTY INFORMATION

GarrettCom, Inc. warrants its products to be free from defects in materials and workmanship for a period of three (3) years from the date of shipment by GarrettCom. During this warranty period, GarrettCom will repair or, at its option, replace components in the products that prove to be defective at no charge other than shipping and handling, provided that the product is returned pre-paid to GarrettCom.

This warranty will not be effective if, in the opinion of GarrettCom, the product has been damaged by misuse, misapplication, or as a result of service or modification other than by GarrettCom. GarrettCom reserves the right to make a charge for handling and inspecting any product returned for warranty repair which turns out not to be faulty.

Please complete the warranty card as this acts as a product registration, and mail it to GarrettCom within two weeks of your purchase.